

# (12) UK Patent Application (19) GB (11) 2 116 470 A

- (21) Application No 8225914  
(22) Date of filing 10 Sep 1982  
(30) Priority data  
(31) 8207369  
(32) 12 Mar 1982  
(33) United Kingdom (GB)  
(43) Application published  
28 Sep 1983  
(51) INT CL<sup>3</sup>  
B26B 21/52 21/54  
(52) Domestic classification  
B4B 33D1 33E 36D1 36D2  
(56) Documents cited  
GB 0356132  
(58) Field of search  
B4B  
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## (54) Safety razors

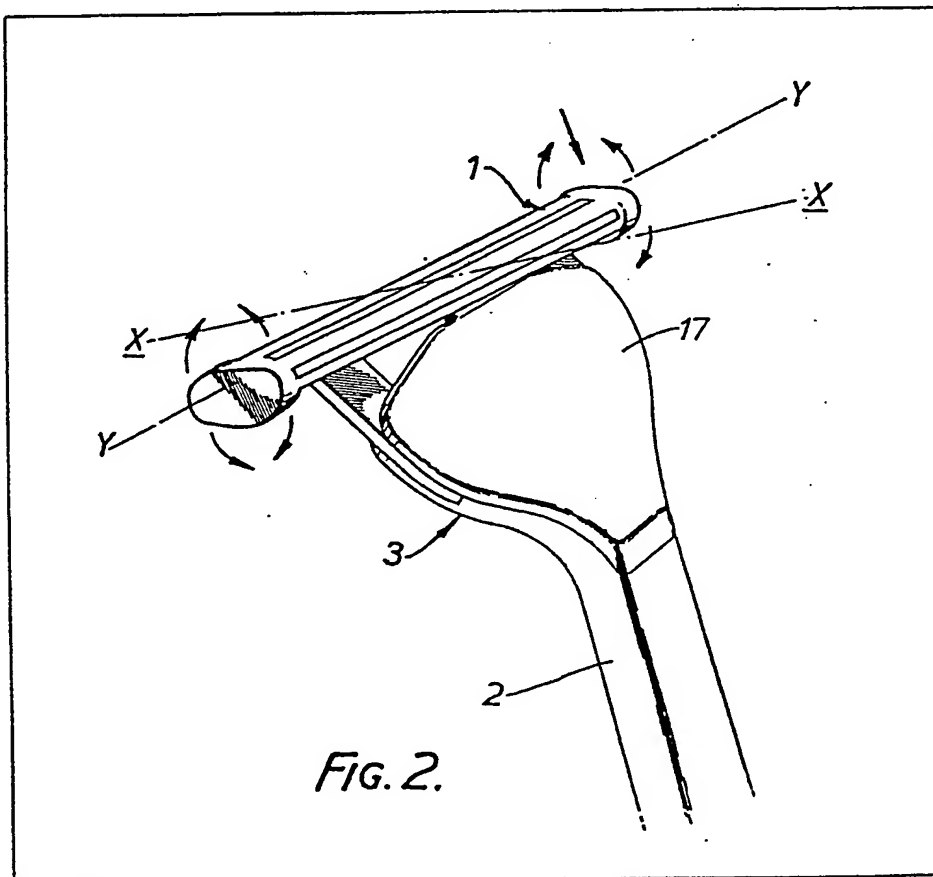
(57) A safety razor comprises a handle (2) carrying a blade head, or cartridge, (1) including a blade member having an elongate cutting edge. The head 1 is mounted on the handle with freedom to move about a rocking axis (XX) which is transverse to the cutting edge, and which is substantially parallel with a notional tangent plane containing the skin engaging portions of the razor head, so that the head can

rock on the handle, about the axis for improved conformance to facial contours.

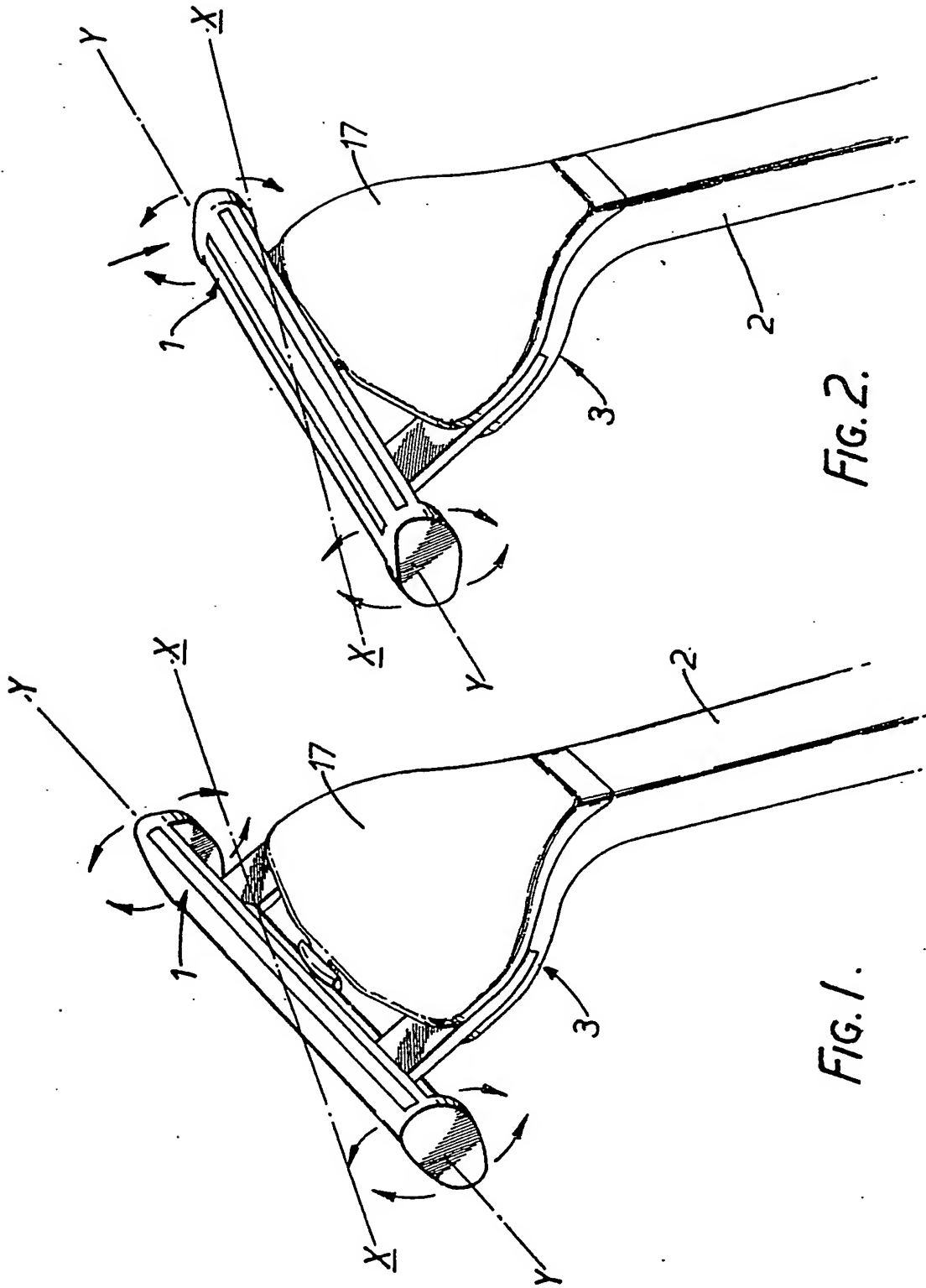
The head may additionally be mounted for movement about an axis (YY) parallel with the cutting edge in manner known *per se*.

Alternatively, the head may include an arched foil having a plurality of sharp edged apertures therein which constitute separate blade edges.

In each case, the head may be permanently attached to the razor handle or replaceable.



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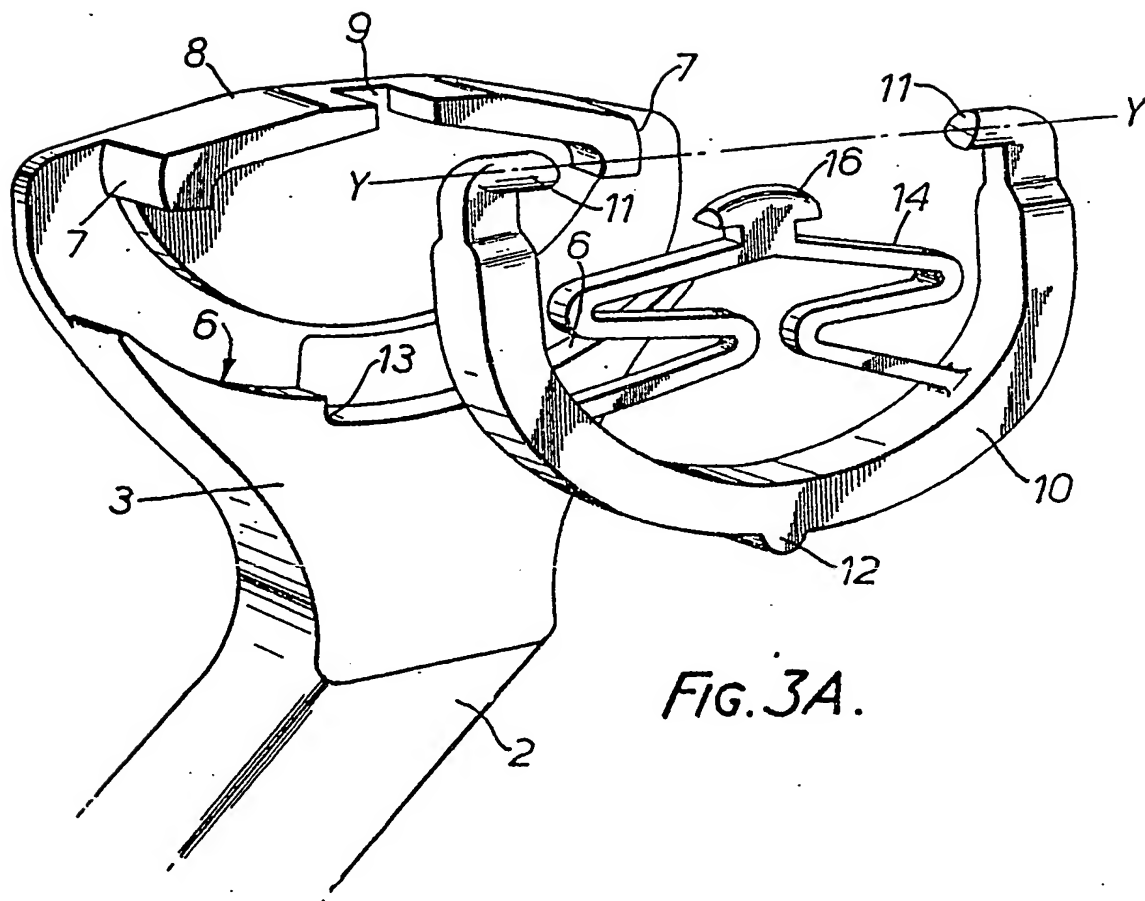


FIG. 3A.

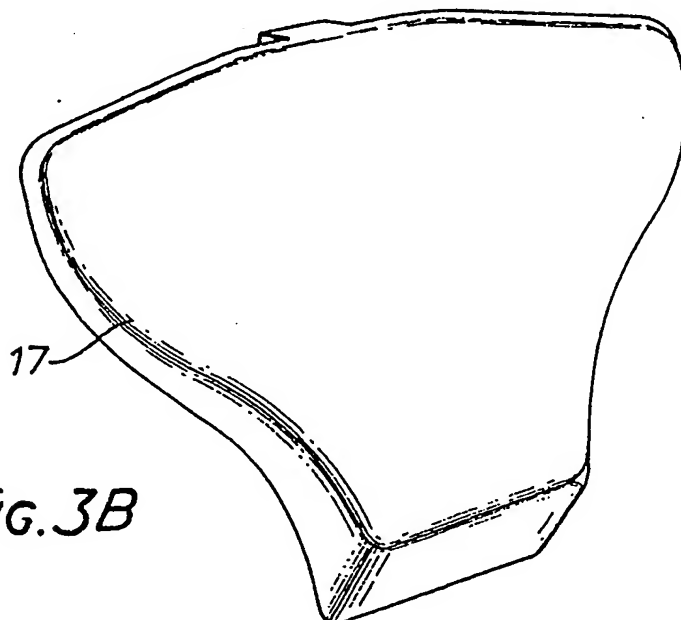


FIG. 3B

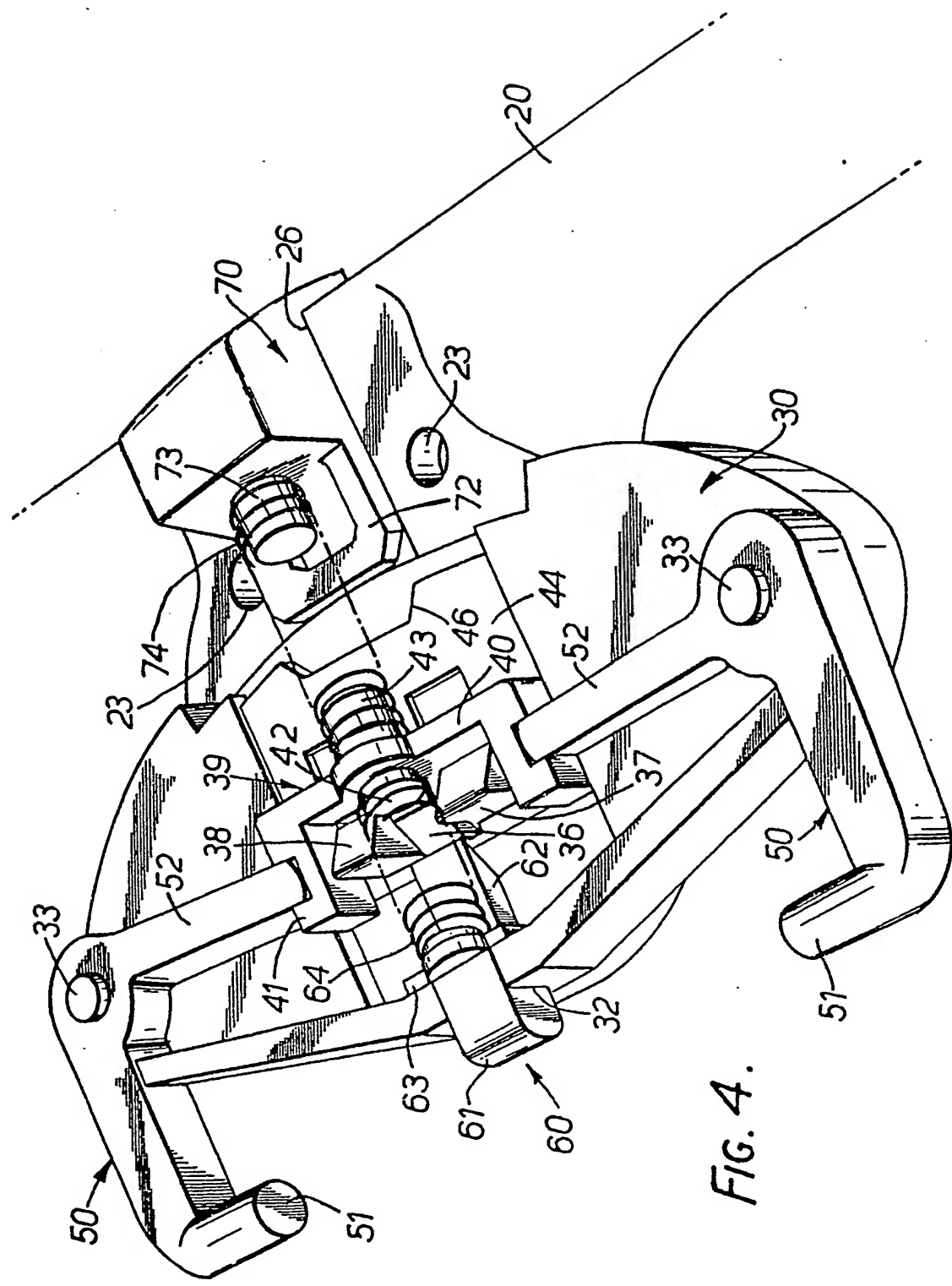
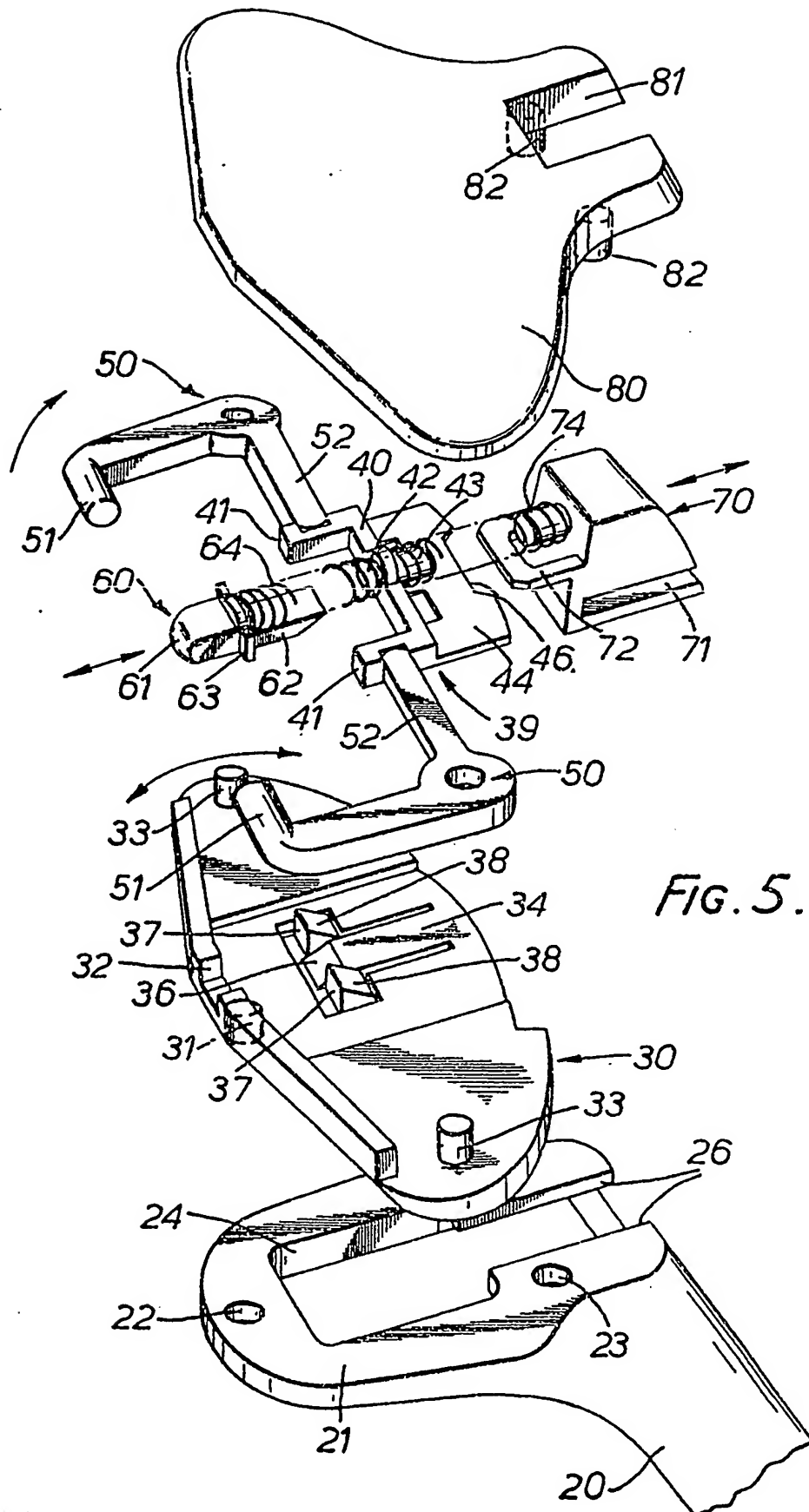


FIG. 4.

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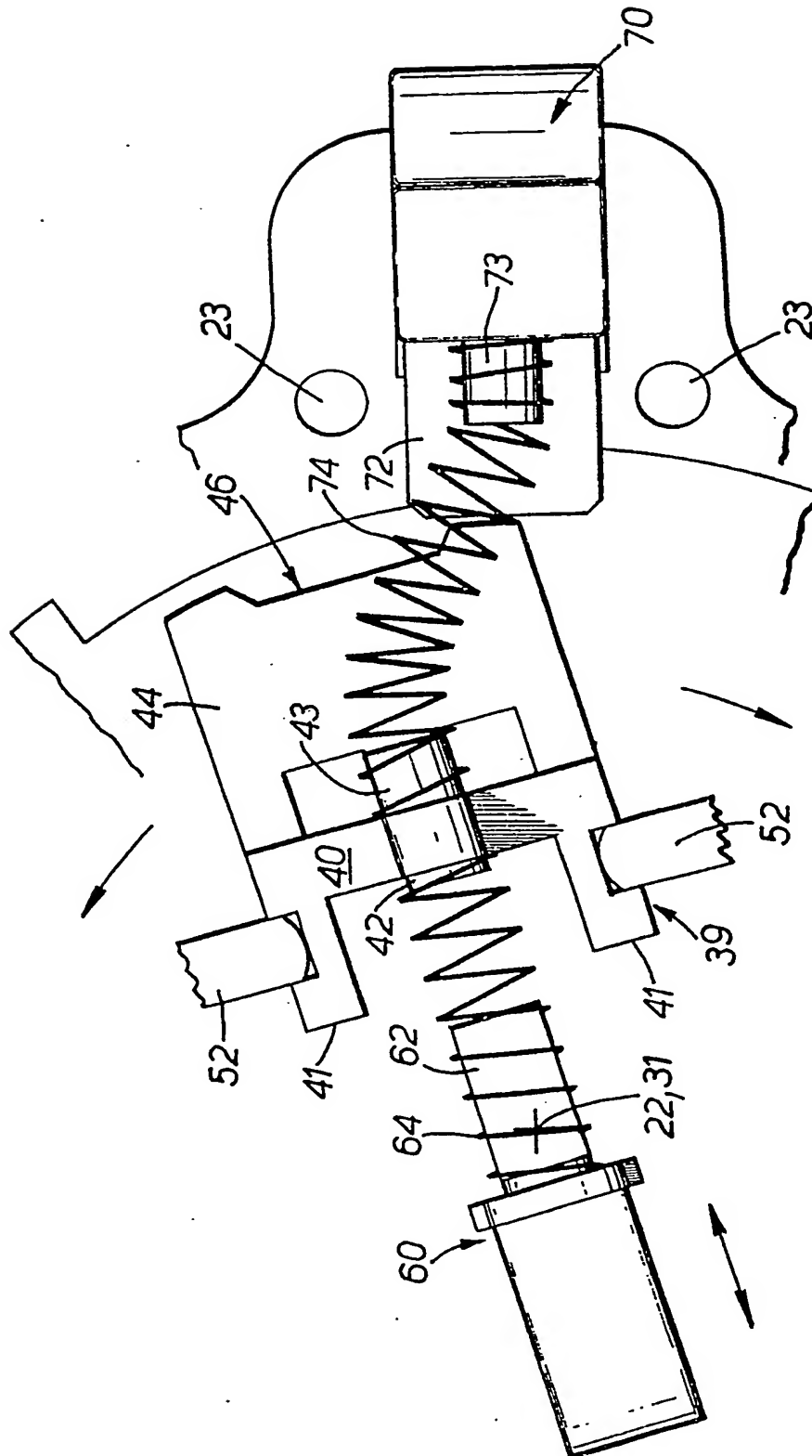


FIG. 6.

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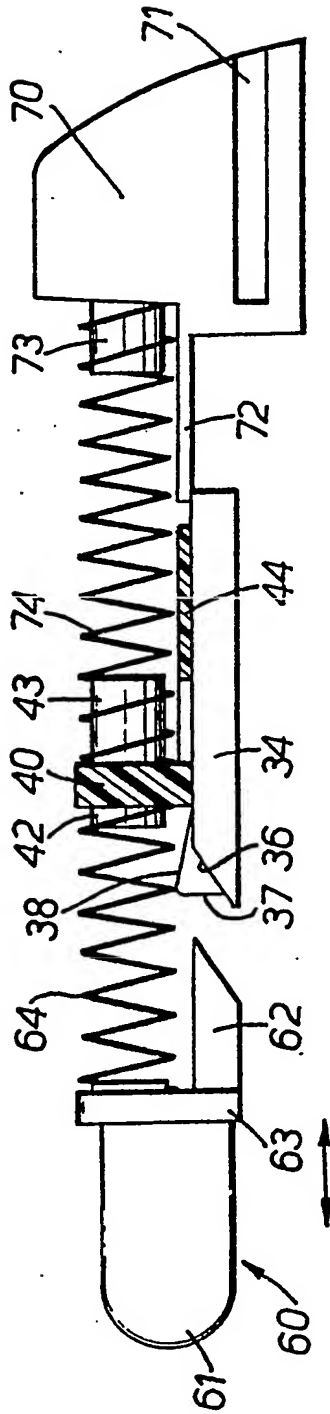


FIG. 7.

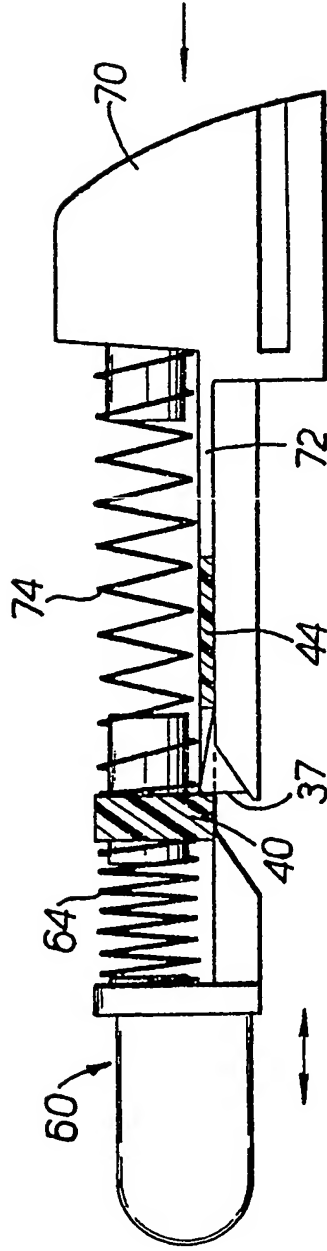


FIG. 8.

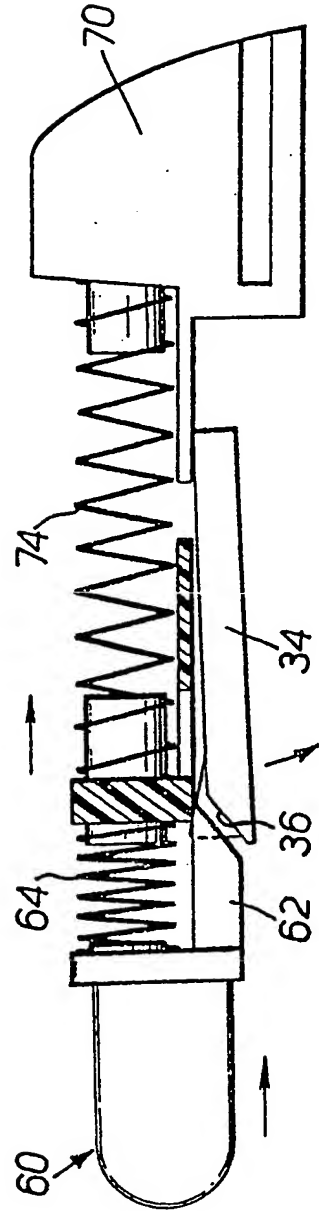
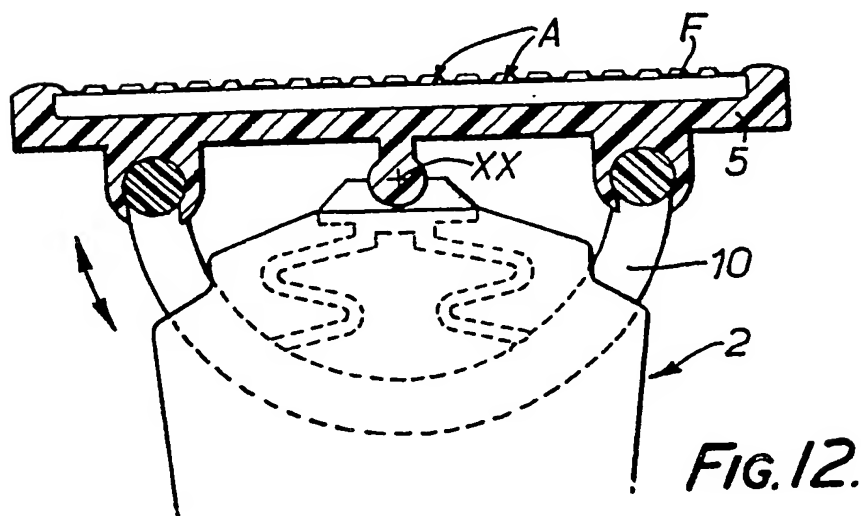
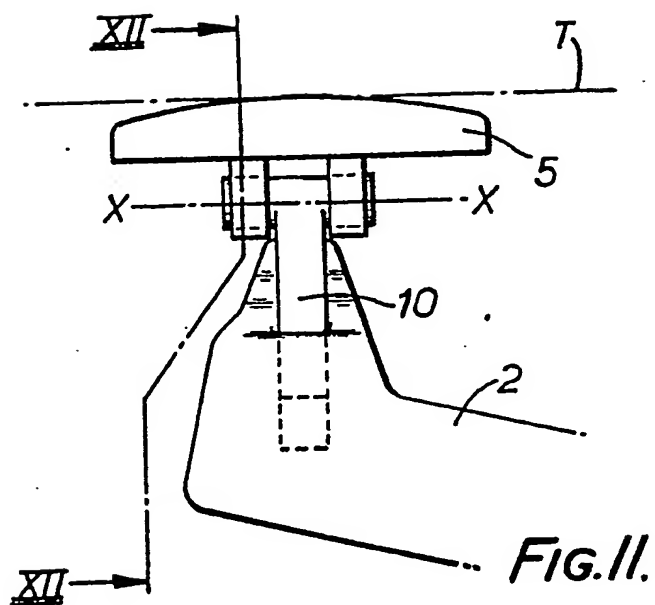
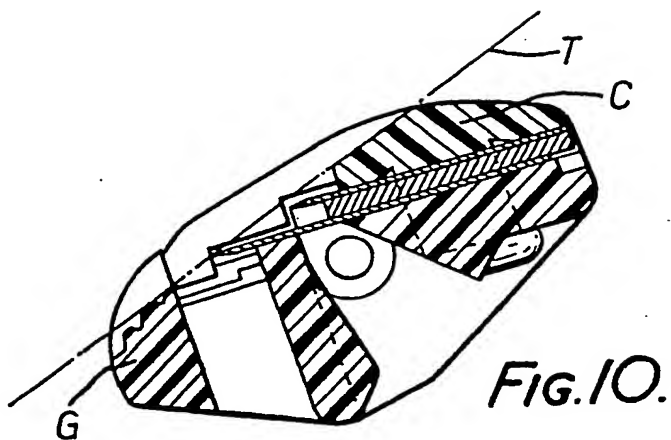


FIG. 9.

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## SPECIFICATION

## Safety razors

This invention relates to safety razors of the well known form comprising an elongate razor head carried at the upper end of a handle.

In most razors currently available, the head is fixedly mounted on the handle in use of the razor, either detachably for replacement of the blade member or of the head (cartridge) as a whole, or permanently in the case of disposable razors.

However, there is now another class of razor on the market in which the head is so connected to the handle, either removably or permanently, that the head can pivot in use of the razor relative to the handle, about an axis parallel with the longitudinal axis of the head, so as to follow more closely the contours of the area being shaved.

In the razors currently available on the market, the razor head incorporates one or two blade members, having an elongate cutting edge or cutting edges, the edge or edges constituting a skin engaging portion, and further skin engaging portions arranged on either side of the edge or edges, namely a guard portion and a cap portion. These skin engaging portions are contained or substantially contained in a notional tangent plane, which may be defined for convenience as a plane drawn tangent to the foremost and rearmost skin engaging surfaces of the head. In a typical example the notional plane is tangent to skin engaging surfaces of the guard and cap portions. The blade edge or edges may be in the same plane or slightly displaced therefrom.

In another form of razor which is the subject of various paper proposals but not yet marketed, the razor head comprises a foil which is held in arched condition in the head and which has a plurality of apertures in it whose edges are sharpened to constitute individual cutting edges. This type of razor is intended to be used with a scrubbing action, i.e. it is moved to-and-fro over the skin in directions transverse to the length of the foil, which is parallel to its axis of curvature.

In this case, for either direction of movement one edge of each hole engaged with the skin acts as a cutting edge, and the opposite edge of the same hole acts as a skin supporting surface corresponding with a guard portion, while other parts of the foil provide a skin support function equivalent to that of a cap portion.

For the purposes of the present description and appended claims, the notional tangent plane for a razor head of this form is taken to be tangent to the foil at the centre of its arcuate length.

With this type of head, there is no provision for pivotal movement about the longitudinal axis, but the head is fixed in this respect relative to the handle.

The present invention is applicable to the various forms of razor described above, and resides broadly in a razor comprising a handle and an elongate razor head mounted at one end of the handle for movement, relative to the handle, about a rocking axis extending transversely to the length

of the head, so that in use of the razor, the ends of the head can move relative to each other, in order to follow the contours of the area being shaved.

The rocking action in question can be combined with pivotal motion, as described above, of the head relative to the handle about an axis parallel with the cutting edge or edges to provide a "gimbal" or universal coupling so as to improve even further the ability of the head to conform to skin contours.

This universal type of action could be obtained by a form of ball and socket connection but in the embodiments described below the two pivotal axes are provided by separate, independent connections.

These embodiments will now be described in detail, by way of example, with reference to the accompanying drawings, in which:—

Figure 1 is a rear perspective view of a razor in accordance with the invention in a central, or neutral position;

Figure 2 is a view like Figure 1 showing the head tilted down at one end and up at the other;

Figures 3A, 3B together comprise an exploded perspective view of the razor handle components;

Figure 4 is a perspective view of a second form of razor in accordance with the invention, with a cover removed for clarity;

Figure 5 is an exploded perspective view of the razor shown in Figure 4;

Figure 6 is a scrap plan view showing some of the components of the razor shown in Figures 4 and 5;

Figures 7, 8 and 9 are side elevations showing some components of the razor in different operating positions;

Figure 10 is a cross-section of the razor head shown in Figures 1 and 2;

Figure 11 is a plan view of an alternative form of razor head; and

Figure 12 is a section in the line XII—XII of Figure 11.

The razor illustrated in Figures 1 to 3B a head 1 of a form known in itself and marketed under the name "Gillette Contour". This comprises a plastics support structure sandwiching a pair of tandem blades and formed on the underside with a central cam formation and a pair of female pivot portions formed by apertured lugs. A cartridge, or blade unit, of this form is described in detail in British Patent Specification No. 1523376.

A cross-section of such razor head is shown in Figure 10. The head 1 comprises a guard G, a cap C and a pair of tandem blades B1, B2, sandwiched between them. The notional tangent plane is indicated at T. The female pivot portions are seen at P.

The razor handle comprises an elongate grip portion 2 with a support structure at its upper end. Integral with the portion 2 is a plate-like portion 3 comprising an arcuate channel defined by respective, interrupted arcuate wall portions 6 and 7, the latter being formed as an upstanding front wall 8 having a central opening 9.

The handle further comprises a generally C-shaped yoke member 10 whose free ends carry inwardly directed, aligned pivot pins 11 for location in the above mentioned apertured lugs of the head. The bulk of the member 10 locates in the arcuate channel of the handle, with its free ends projecting forwardly and is free to move about the common centre of curvature of the channel through an arc limited by engagement of a stop 12 formed on the yoke member with the edges of a recess 13 formed in the portion 3 of the handle.

Thus it can be seen that the head 1, when mounted on the pivot pins of the yoke can rock about the axis defined by the above mentioned centre of curvature. This rocking axis, which is indicated at 'XX' in Figures 1 and 2, is substantially parallel with the tangent plane T and transverse to the length of the head.

The yoke member, which is conveniently formed as a plastics moulding, comprises an integral spring member 14 formed as a pair of double hairpin springs connected together at their forward, central parts, at which the spring is formed with a cam follower 16.

The yoke member is located in the handle with the cam follower 16 projecting through the central opening 9 and is held in place by a cover plate 17.

The cam follower 16 engages the cam formation on the head and exerts on the head, through the action of the spring 14, a force tending to hold the head in a central, medial position about its pivot axis 'YY' defined by the pins 11. The spring 14 also biases the yoke member 10 to a central position, but deforms resiliently to permit rocking of the head about the axis 'XX'.

The two axes 'XX' and 'YY' may intersect or be slightly offset, but both are preferably close to the blade edges in order to provide maximum conformance to skin contours during shaving.

The razor illustrated in Figures 4 to 9 is again designed for use with a "Gillette Contour" cartridge, but in this case is constructed to permit ready replacement of a used cartridge by a fresh one.

The handle comprises a grip portion 20 having a forwardly extending, integral head plate 21 at its upper end, formed with a central, forward hole 22 and two side holes 23. The plate 21 has a generally rectangular central opening 24 open at its rear end to a slot defined by intumed guide rails 26.

Mounted on the head plate 21 is a swivel plate 30 having at its centre, near its front edge a depending pivot pin 31 which engages in the hole 22 to define a pivot axis XX about with the swivel plate and the other components (to be described) which it carries, can rock relative to the handle.

At its forward edge the swivel plate has an upstanding wall interrupted by a central gap 32. Near its ends, the swivel plate has two upstanding pivots 33 and within the central portion of the component, which is of reduced thickness, there is integrally formed a cantilever spring finger 34 having a central ramp 36 sloping downwardly and

forwardly, and two integral latches 37 whose front surfaces are perpendicular to the main plane of the swivel plate and having rearwardly sloping cam surfaces 38.

Slidably mounted in the recessed medial portion of the swivel plate is a latch member 39, moulded to have a U-shaped forward portion with a cross-piece 40 and forwardly projecting arms 41; two spring locating bosses 42 and 43 directed respectively fore and aft; and a plate-like rear portion 44 having at its rear edge a notch 46 with forwardly convergent sloping side edges.

A pair of bell-cranks 50 are pivotally mounted at their elbows on the pivots 33 for pivotal movement parallel with the plane of the swivel plate. The forwardly extending arms of the bell cranks terminate at inwardly directed pivot pins 51 which define the mounting axis YY for a blade cartridge (not shown). The laterally extending arms 52 of the bell cranks engage in notches in the arms 41 of the latch member 39, with sufficient clearance to permit some angular movement between the arms 52 and 41 respectively, so that fore and aft movement of the latch member will effect pivotal movement of the bell cranks and corresponding movement of the pivot pins 51, in opposite directions, i.e. towards and away from each other.

Mounted in the gap 32 in the front wall of the swivel plate is a plunger 60, the forwardly projecting portion of which constitutes a cam follower 61, and having a rearwardly extending tail 62 having a sloping undersurface at its rear end. The plunger has a transverse medial wall 63 which acts as a stop to limit forward movement of the plunger relative to the swivel plate and also as an abutment for a plunger spring 64 whose opposite, rear end is engaged over the boss 42 of latch member 39. The spring is under light compression so as to urge the plunger forwardly but also to permit it to retract under forces transmitted to the plunger by the cartridge cam formation during shaving.

A moulded button 70 is formed with side grooves 71 by which the button is mounted on the guide rails 26 of the head plate 21. The button has a forwardly extending plate portion 72 whose forward edge is shaped to complement that of the notch 46 of latch member 39, and a forwardly projecting boss 73 to act as an anchorage and abutment for a latch spring 74, the forward end of which is similarly anchored on the boss 43 of the latch member, the spring acting to urge the button rearwardly.

The razor is completed by a cover member 80 having at its rear edge a slot 81 to accommodate the button 70 and on its underside a pair of integral rivet pins 82 which pass through the holes 23 of the head plate and are cold headed to secure the assembly.

In Figure 4, the movable parts are shown in the positions they occupy when a cartridge is mounted on the razor, except that the plunger would be held by the cartridge in a position somewhat to the rear of the position illustrated.

Rotation of the cartridge about the axis YY takes place as previously described, with the plunger 60 and spring 64 acting to apply a centralising, restoring force to the cartridge. Additionally, the swivel plate 30 can rock about its pivot pin 31 on the axis XX. As illustrated in the scrap view of Figure 6, this rocking is permitted by lateral flexure of latch spring 74, which tends to re-centralize the swivel plate when offset forces are removed from the cartridge:

The operation of the razor to exchange cartridges is illustrated in Figures 7, 8 and 9.

Figure 7 illustrates the normal operative position of the relevant parts with a cartridge in position, i.e. corresponding with the positions seen in Figure 4, the plunger 60 being free to move back and forth and the swivel plate free to rock about its pivot.

To release a used cartridge, forward pressure is applied, usually by the thumb, causing the spring 74 to compress and move the latch member 39 forwardly. This in turn causes the bell cranks to pivot, moving the pivot pins 51 apart at their position of maximum separation to release the used cartridge. In the latter phase of forward movement of the latch member, its cross-piece 40 rides over cam surfaces 38 to depress the spring finger 34, until the rear edge of cross-piece 40 passes over the latches 37, whereupon the finger 34 recovers and causes the latches to engage behind the cross-piece 40 to prevent return movement of the latch member. In the same forward movement of the button 70, the plate portion 72 engages in the notch 46 of the latch member plate portion 44 to lock the swivel plate against rotation. This final position of the parts is seen in Figure 8.

To engage a new cartridge, the razor is offered up to the underside of the cartridge and presses the razor against it, causing the plunger 60 to be depressed (by the cartridge cam formation) against the action of spring 64. The latch member is released by the tail 62 of the plunger engaging the ramp 36, thereby depressing the spring 34 and disengaging the latches 37 from the latch member cross-piece 40 (see Figure 9). The latch member is thereupon moved rapidly rearwardly, by the stored energy in spring 64, causing the bell cranks to pivot and engage the journal portions of the new cartridge. During this manipulation, the user relaxes pressure on the button 70 which automatically returns to its normal position, and the plunger 60 also returns, under the action of spring 64 to the maximum extent permitted by the cartridge. The razor is now ready for use.

Figures 11 and 12 illustrate an alternative form of razor head, which comprises a foil F held by a support frame 5 in arched condition and having a plurality of apertures A with sharpened edges, for use in the manner described in the preamble hereto. The head is held against pivotal movement about its longitudinal axis, but is otherwise carried by a yoke member 10 arranged as in Figures 1 to 3, so as to be parallel with the

notional tangent plane T, at the mid-point of the arcuate extent of the foil, and transverse to the length of the head.

#### CLAIMS

1. A razor comprising a handle and an elongate razor head mounted at one end of the handle for movement, relative to the handle, about a rocking axis, extending transversely to the length of the head, so that in use the razor, the ends of the head can move relative to each other, in order to follow the contours of the area being shaved.

2. A razor according to claim 1, wherein the said rocking axis is substantially parallel with a notional plane tangent to the skin engaging portions of the razor head.

3. A safety razor comprising an elongate razor head carried at the upper end of a handle, the head incorporating at least one blade member having a cutting edge, and further skin engaging portions to either side of the said edge, the edge and further skin engaging portions all extending longitudinally of the razor head, wherein the said head is connected to the handle in a manner permitting the head to rock, relative to the handle, about a rocking axis extending transversely to the length of the head and substantially parallel with a notional plane tangent to the skin engaging portions of the razor head.

4. A safety razor according to claim 3, wherein the razor handle carries at its upper end a yoke member mounted on the handle for angular movement about the said axis, the yoke member having forwardly projecting spaced arms having free ends to which the said head is coupled.

5. A safety razor according to claim 4, wherein the free ends of the yoke arms carry pivotal mountings for mounting the head and which define a pivotal axis, parallel with the cutting edge of the blade member and about which the head can pivot during use in shaving.

6. A safety razor according to claim 4 or 5, wherein the yoke member is generally C-shaped, having an arcuate portion located in an arcuate channel formed in the razor handle, the yoke member being free to slide in the arcuate channel, the centre of curvature of which defines the said axis.

7. A safety razor according to claim 4, 5 or 6, wherein the razor includes spring means acting on the yoke member to bias it into a mutual medial position about the said axis.

8. A safety razor according to claim 6, wherein the said yoke means is formed integrally with the yoke member.

9. A safety razor according to claim 7 or 8, wherein the head is mounted on the yoke arms for pivotal movement about a pivotal axis parallel with the cutting edge of the blade, and the said spring means also acts on the head to apply to the head a resilient restoring force tending to maintain the head in a medial position about the said pivotal axis.

10. A safety razor comprising an elongate razor handle having at its upper end an integral, plate-

like portion formed with an arcuate groove, a generally C-shaped yoke member having an arcuate medial portion mounted in said groove for movement about a rocking axis defined by the centre of curvature of the said groove, the said yoke member having free arms projecting forwardly of the plate-like portion and pivotal mounting means at the forward ends of the said arms, co-operating stop means on the yoke member and plate-like portion to limit movement of said yoke member to either side of a medial position of said yoke member about said rocking axis;

spring means formed integrally with said yoke member and acting against said plate-like portion to urge said yoke member into said medial position, the spring means also being integral with a head engaging portion projecting forwardly of the plate-like portion;

a cover plate enclosing said yoke member except for said projecting free arms and secured to said plate-like portion;

and an elongate head comprising a support structure and at least one planar blade member having a cutting edge, the head comprising further skin engaging portions to either side of said head and contained in a notional tangent plane, said head being mounted on said pivotal mountings of said yoke member for pivotal movement about a pivot axis parallel with the cutting edge of the blade member, the said rocking axis being substantially parallel with the said tangent plane of the head when the latter is in a medial position, said head engaging portion engaging said head and urging it to its said medial position.

11. A razor according to claim 3, wherein the handle includes an elongate grip portion, a swivel plate mounted at the upper end of the grip portion for swivelling motion about the said rocking axis, a pair of spaced arms mounted on the swivel plate and projecting forwardly therefrom, the arms having free, forward end portions including mounting means on which the said head is carried, the said arms being coupled together for movement in unison and in opposite directions towards and away from each other.

12. A razor according to claim 11, including spring means acting on the swivel plate to urge it to a medial position, relative to the rest of the handle, about the said rocking axis.

13. A razor according to claim 11 or 12, wherein the said arms are mounted on the swivel plate by spaced pivotal connections and are coupled together for movement of the free ends of the arms towards and away from each other to permit engagement and disengagement of the said mounting means with a said head.

14. A razor according to claim 13, wherein each said arm forms part of a respective bell-crank lever having respective laterally extending arms

engaged at their inner ends with a common member slidably mounted in the handle for rectilinear movement in a fore-and-aft direction parallel with the plan of pivotal movement of the bell-crank levers, the common member being resiliently urged forwardly to bias the said mounting means towards each other to retain the head in position.

15. A razor according to claim 14, wherein the said common member is a latch member co-operating with latches provided on the swivel plate, and wherein a manually operable button is provided on the razor handle and is movable forwardly to force the latching member into latching engagement with the said latches, whereby to move the said mounting means into a position of maximum separation and retain them in that position until the latching engagement is released.

16. A razor according to claim 15, wherein a plunger is mounted on the handle in front of the latch member, with compression spring means acting between the plunger and the latch member, the said plunger being movable rearwardly towards the latch member against the action of the compression spring means and having rearwardly extending tail aligned with said latches and adapted to displace them to effect release of the latching engagement.

17. A razor according to claim 16, wherein the forward end of the plunger is positioned to be engageable by a portion of a head suitably positioned between the said mounting means when the latter are in their position of maximum separation, whereupon the plunger is depressed by the head to release the said latching engagement, causing the latch member to move rearwardly and the mounting means to move towards each other into coupling engagement with the head.

18. A razor according to claim 17, wherein the head is pivotally mounted on said mounting means for pivotal movement about a pivot axis parallel with the cutting edge of the blade member, the head having a cam formation engaged by said plunger, which applies to the head a resilient restoring force tending to maintain or restore the head in or to a medial position about said pivot axis.

19. A razor according to claim 12, or to any one of claims 13 to 17 when appended to claim 12, wherein the spring means acting on the swivel plate takes the form of a coil compression spring which is free between its ends to flex laterally.

20. A safety razor substantially as herein described with reference to Figures 1 to 3 of the accompanying drawings.

21. A safety razor substantially as herein described with reference to Figures 4 to 9 of the accompanying drawings.